IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of: Kenneth Burdick, Raymond A. Lia and Robert L. Vivenzio

Docket No.: 281_334

Ser. No.: 10/058,191

Patent No.: 6,828,801 B1

Filed: October 26, 2001

Issued: December 7, 2004

For: CAPACITIVE SENSOR

Certificate
JAN 12 2005
of Correction

REQUEST FOR CERTIFICATE OF CORRECTION
PATENT OFFICE ERROR

Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450
Attn: Certificate of Correction

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Evelyn B. Hall

Evelyn B. Hall

Sir:

Receipt of the above-identified patent is hereby acknowledged.

In checking the original patent against our file, however, several errors were noted. For example and referring to Claims No. 1, 6 and 8 the word **chance** is incorrect should be **changes**. Other errors are noted on the attached certificate. Please refer to our previously filed Amendment, dated July 14, 2004. A copy of this Amendment is attached for your review.

It is, therefore, requested that a Certificate of Correction be issued as per the attached form Certificate for Correction submitted herewith in duplicate.

It is believed that each of the errors are the result of the Office and therefore no fee is due. However, in the event that any fees are required as a result of this paper, the Commissioner is hereby authorized to charge any additional fees associated with this communication or credit any overpayment to Deposit Account No. 50-0289. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

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JAN 13 2005

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JAN 13 2005

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO : 6,828,801 B1

DATED : December 7, 2004

INVENTOR(S) : Kenneth Burdick, Raymond A. Lia and Robert L. Vivenzio

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

The following corrections are listed by reference to column and line numbers of the original patent with reference to the above noted claims.

CLAIMS

Column 14, Line 14, pertaining to Claim 1. the word "chance" is incorrect, please replace with the word -- changes --; and

Line 16, pertaining to Claim 1. the phrase with the "chance" should read -- with the change --; and

Line 29, pertaining to Claim 1. the word "comprises" should be omitted.

Column 15, Lines 10 and 17, each pertaining to Claim 6. the word "chances" is incorrect in each instance; please replace with the word -- changes --.

Column 15, Lines 36 and 42, pertaining to Claim 8. the word "chances" is incorrect, please replace with the word -- changes --.

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PATENT NO. 6,828,801 B1

No. of additional copies 1 of 1

COPY

Practitioner's Docket No.: 281_334 *PATENT*

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of: Burdick et al.

Serial No.: 10/058,191 Art Unit: 2858

Filed: October 26, 2001 Examiner: Timothy J. Dole

Confirmation No.: 3947

For: CAPACITIVE SENSOR

Mail Stop Amendment
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P.O. Box 1450
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Susanne C. Aregano

Susanne C. Aregano

AMENDMENT AFTER FINAL ACTION PURSUANT TO 37 CFR 1.116

Sir:

In response to the final Office Action, dated April 16, 2004, please amend the above-captioned patent application, without prejudice, as follows:

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks begin on page 13 of this paper.

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the above-captioned patent application:

Listing of Claims:

1. (Canceled)

2. (Canceled)

3. (Canceled)

Cl. 1

4. (Currently Amended) ~~The sensor of claim 3,~~ A capacitive sensor for measuring a stimulus parameter, the sensor comprising:

a circuit board including at least one metallic layer;

a metallic diaphragm coupled to the circuit board and juxtaposed to the metallic layer to thereby form a transducer capacitor characterized by a capacitance, the metallic diaphragm being adapted to move relative to the at least one metallic layer in response to a change in the stimulus parameter, whereby the capacitance changes in accordance with the change in the stimulus parameter; and

an oscillator circuit including a low-pass filter and coupled to the transducer capacitor, the oscillator circuit being configured to generate a filtered signal characterized by a frequency, whereby the frequency changes in accordance with capacitance changes further comprising:

a conductive ring disposed between the metallic diaphragm and the circuit board; and

a pressure port assembly coupled to the conductive ring, whereby a cavity is formed between a pressure port and the metallic diaphragm,

~~wherein~~ the pressure port assembly further ~~comprises~~ comprising:

a snap-on cap coupled to the conductive ring; and

a compressible sealer element disposed between the snap-on cap and the metallic diaphragm, whereby substantially symmetrical forces are applied to the metallic diaphragm to thereby seal the cavity.

Cl. 2 5. (Original) The sensor of claim 4, wherein the compressible sealer element has a substantially rectangular cross-section.

Cl. 3 6. (Original) The sensor of claim 4, wherein the compressible sealer element includes an o-ring.

Cl. 4 7. (Currently Amended) ~~The sensor of claim 3,~~ A capacitive sensor for measuring a stimulus parameter, the sensor comprising:

a circuit board including at least one metallic layer;

a metallic diaphragm coupled to the circuit board and juxtaposed to the metallic layer to thereby form a transducer capacitor characterized by a capacitance, the metallic diaphragm being adapted to move relative to the at least one metallic layer in response to a change in the stimulus parameter, whereby the capacitance changes in accordance with the change in the stimulus parameter; and

an oscillator circuit including a low-pass filter and coupled to the transducer capacitor, the oscillator circuit being configured to generate a filtered signal characterized by a frequency, whereby the frequency changes in accordance with capacitance changes further comprising:

a conductive ring disposed between the metallic diaphragm and the circuit board; and

a pressure port assembly coupled to the conductive ring, whereby a cavity is formed between a pressure port and the metallic diaphragm

wherein the circuit board includes a metallic land disposed between the conductive ring and the circuit board, the metallic land being adapted to support the conductive ring.

Cl. 5 8. (Original) The sensor of claim 7, wherein the metallic land is co-planar with the at least one metallic layer.

Cl. 6 9. (Currently Amended) ~~The sensor of claim 1,~~ A capacitive sensor for measuring a stimulus parameter, the sensor comprising:

a circuit board including at least one metallic layer;

a metallic diaphragm coupled to the circuit board and juxtaposed to the metallic layer to thereby form a transducer capacitor characterized by a capacitance, the metallic diaphragm being adapted to move relative to the at least one metallic layer in response to a change in the stimulus parameter, whereby the capacitance changes in accordance with the change in the stimulus parameter; and

an oscillator circuit including a low-pass filter and coupled to the transducer capacitor, the oscillator circuit being configured to generate a filtered signal characterized by a frequency, whereby the frequency changes in accordance with capacitance changes;

wherein the circuit board includes at least one guard ring disposed within a thickness of the circuit board, the guard ring being adapted to reduce stray capacitance between the metallic diaphragm and the metallic layer.

Cl. 7 10. (Original) The sensor of claim 9, wherein the at least one guard ring mitigates the effects of sensor performance variations due to temperature induced variations of a dielectric constant of the circuit board.

11. (Canceled)

12. (Canceled)

13. (Canceled)

14. (Canceled)

Cl. 8

15. (Currently Amended) ~~The sensor of claim 11,~~ A capacitive sensor for measuring a stimulus parameter, the sensor comprising:

a circuit board including at least one metallic layer;

a metallic diaphragm coupled to the circuit board and juxtaposed to the metallic layer to thereby form a transducer capacitor characterized by a capacitance, the metallic diaphragm being adapted to move relative to the at least one metallic layer in response to a change in the stimulus parameter, whereby the capacitance changes in accordance with the change in the stimulus parameter;

an oscillator circuit including a low-pass filter and coupled to the transducer capacitor, the oscillator circuit being configured to generate a filtered signal characterized by a frequency, whereby the frequency changes in accordance with capacitance changes wherein the low-pass filter includes an impedance element coupled to a first shunt capacitor; and ~~further comprising~~ a second capacitor disposed between the transducer capacitor and AC ground to form a voltage divider.

Cl. 9

16. (Previously Presented) The sensor of claim 15, wherein the low-pass filter includes a series impedance element coupled to the input of the transducer, and a capacitor disposed between an output of the transducer and AC ground to thereby form a voltage divider.

Cl. 10

17. (Currently Amended) The sensor of claim 16, wherein the series impedance element includes a resistor, or an inductor, or both.

Cl. 11

18. (Original) The sensor of claim 17, wherein the second capacitor forms a capacitance divider with an inter-plate capacitance generated between the metallic diaphragm and the metallic layer.

Cl. 12

19. (Original) The sensor of claim 18, wherein the capacitance divider is configured to reduce diode conduction within an input circuit of the oscillator.

20. (Canceled)

21. (Canceled)

22. (Canceled)

23. (Canceled)

24. (Canceled)

25. (Canceled)

26. (Canceled)

27. (Canceled)

28. (Canceled)

29. (Canceled)

30. (Canceled)

Cl. 13

31. (Original) A capacitive sensor system for measuring a stimulus parameter, the system comprising:

a circuit board including at least one metallic layer disposed therein;

a metallic diaphragm coupled to the circuit board to thereby form a variable

capacitor, the variable capacitor being characterized by a variable capacitance, the metallic diaphragm being adapted to move relative to the at least one metallic layer in response to a change in a stimulus parameter, such that the capacitance is varied in accordance with stimulus parameter changes;

an oscillator circuit disposed on the circuit board and coupled to the variable capacitor, the oscillator circuit including a low-pass filter configured to generate a filtered signal characterized by a frequency that changes in accordance with the capacitance; and

a processor coupled to the oscillator circuit, the processing circuit being configured to derive a value of the stimulus parameter from the frequency.

Cl. 14

32. (Currently Amended) The system of claim 31, wherein the at least one metallic layer includes two co-planar ~~rings~~ electrodes disposed on a surface of the circuit board.

Cl. 15

33. (Original) The system of claim 32, wherein the metallic diaphragm is grounded.

Cl. 16

34. (Currently Amended) The system of claim 32, wherein the two co-planar ~~rings~~ electrodes are inter-digitated.

Cl. 17

35. (Currently Amended) The system of claim 32, wherein the two co-planar ~~rings~~ electrodes are characterized by a spiral shape.

Cl. 18

36. (Previously Presented) The system of claim 32, further comprising a ground conductor layer disposed on a second surface of the circuit board parallel to the surface of the circuit board, whereby the ground conductor layer and the metallic diaphragm shield the two co-planar rings from AC-signals.

Cl. 19 37. (Original) The system of claim 31, wherein the processor includes a gain correction circuit, the gain correction circuit being configured to multiply a number representing the frequency by a correction factor.

Cl. 20 38. (Currently Amended) The system of claim 37, wherein the correction factor equals an initial zero-~~pressure~~ stimulus parameter frequency value divided by an ambient zero-~~pressure~~ stimulus parameter frequency value.

Cl. 21 39. (Original) The system of claim 31, wherein the processing circuit includes a counter circuit configured to determine the frequency of the filtered signal.

Cl. 22 40. (Original) The system of claim 39, wherein the counter circuit employs a frequency counting method.

Cl. 23 41. (Original) The system of claim 39, wherein the counter circuit employs a period averaging method.

Cl. 24 42. (Original) The system of claim 39, wherein the counter circuit employs a period averaging method that counts frequency pulses within a sampling period.

Cl. 25 43. (Original) The system of claim 42, wherein the period averaging method determines the frequency by solving the equation, frequency = Fref *[(N_n – N_{n-1})/(M_n – M_{n-1})], wherein n is the sampling period, N_n – N_{n-1} is a number of pulses counted in the sampling period, and M_n – M_{n-1} is a number of clock periods occurring during sampling period n.

Cl. 26 44. (Original) The system of claim 43, wherein Fref is a constant.

Cl. 27 45. (Original) The system of claim 43, wherein Fref is a reference frequency.

Cl. 28 46. (Original) The system of claim 31, wherein the stimulus parameter is pressure.

Cl. 29 47. (Original) The system of claim 31, wherein the stimulus parameter is force.

Cl. 30 48. (Original) The system of claim 31, wherein the stimulus parameter is displacement.

Cl. 31 49. (Original) A method for calibrating a capacitive sensor used to measure a stimulus parameter, the method comprising:

providing a sensor including a capacitor transducer and an oscillator circuit, the capacitor transducer being characterized by a variable capacitance that varies in accordance with a change in the stimulus parameter;

determining a correction factor by comparing an initial condition to an ambient condition;

determining the frequency corresponding to the stimulus parameter during ambient conditions; and

correcting the stimulus parameter by multiplying the correction factor by the frequency, whereby a corrected frequency value is obtained.

Cl. 32 50. (Previously Presented) The method of claim 49, wherein the step of determining further comprises the step of:

obtaining an initial condition factory oscillation frequency valve (f_0);

obtaining an initial condition ambient oscillation frequency valve (f_1); and

dividing the initial condition factory oscillation frequency value by the initial condition ambient oscillation frequency value.

Cl. 33 51. (Original) The method of claim 50, wherein the initial condition factory oscillation frequency value is obtained when the sensor is configured in a zero stimulus state.

Cl. 34 52. (Original) The method of claim 50, wherein the initial condition ambient oscillation frequency value is obtained when the sensor is configured in a zero stimulus state.

Cl. 35 53. (Original) The method of claim 50, wherein the correction factor equals, $C = f_0/f_1$.

Cl. 36 54. (Original) The method of claim 53, wherein the corrected frequency equals, $f_C = C^* f_S$, f_S being the frequency corresponding to the stimulus parameter during ambient conditions.

Cl. 37 55. (Original) The method of claim 49, wherein the stimulus parameter is pressure.

Cl. 38 56. (Original) The method of claim 49, wherein the stimulus parameter is force.

Cl. 39 57. (Original) The method of claim 49, wherein the stimulus parameter is displacement.

Cl. 40 58. (Original) The method of claim 49, wherein the stimulus parameter is humidity.

Cl. 41 59. (Previously Presented) A capacitive pressure sensor for measuring a stimulus parameter, the sensor comprising:

a circuit board including at least one metallic layer;

Cl. 41

a metallic diaphragm coupled to the circuit board and juxtaposed to the metallic layer to thereby form a transducer capacitor characterized by a capacitance, the metallic diaphragm becoming substantially curved relative to the at least one metallic layer in response to a change in the stimulus parameter such that the capacitance changes in accordance with stimulus parameter changes; and

an oscillator circuit disposed on the circuit board and coupled to the transducer capacitor, the oscillator circuit being configured to generate a signal characterized by a frequency that changes in accordance with capacitance changes.

60. (Canceled)

Cl. 42

61. (Original) A capacitive sensor for measuring a stimulus parameter, the sensor comprising:

a circuit board including at least one metallic layer;

a metallic diaphragm coupled to the circuit board and juxtaposed to the metallic layer to thereby form a transducer capacitor characterized by a capacitance, the metallic diaphragm being adapted to move relative to the at least one metallic layer in response to a change in the stimulus parameter such that the capacitance changes in accordance with stimulus parameter changes;

at least one guard ring disposed within a thickness of the circuit board, the guard ring being adapted to reduce stray capacitance between the metallic diaphragm and the metallic layer; and

an oscillator circuit coupled to the transducer capacitor, the oscillator circuit being configured to generate a signal characterized by a frequency that changes in accordance with capacitance changes.

Cl. 43 62. (Previously Presented) A capacitive sensor for measuring a stimulus parameter, the sensor comprising:

a circuit board including at least one metallic layer;

a metallic diaphragm coupled to the circuit board and juxtaposed to the metallic layer to thereby form a transducer capacitor characterized by a capacitance, the metallic diaphragm not including an attached metallic plate, the metallic diaphragm being adapted to move relative to the at least one metallic layer in response to a change in the stimulus parameter such that the capacitance changes in accordance with stimulus parameter changes; and

an oscillator circuit disposed on the circuit board an coupled to the transducer capacitor, the oscillator circuit being configured to generate a signal characterized by a frequency that changes in accordance with capacitance changes.

REMARKS

The above-captioned patent application has been carefully reviewed with regard to the Final Office Action to which this Amendment is responsive. Claims 4, 7, 9, 15, 17, 32, 34, 35 and 38 have been amended in an effort to further clarify and distinctly describe that which is regarded as the present invention. Claims 1-3, 11-14, 21-30, and 60 have been canceled. To that end, no new matter has been added.

Applicant gratefully acknowledges the allowability of Claims 31-59, 61 and 62 over the prior art of record. The Examiner has also objected to but provisionally has allowed Claims 4-10, 15-19 and 22. To that end, Applicant has now amended Claim 4 by making this claim independent and incorporating the subject matter of base Claims 1 and 3. Similarly, Applicant has also amended Claim 7 to incorporate the subject matter of Claims 1 and 3, Claim 9 to include the subject matter of Claim 1 and Claim 15 to include the subject matter of Claims 1 and 11. Since each of Claims 4, 7, 9, and 15 have been deemed allowable by the Examiner, it is respectfully submitted that each of these claims are now in an allowable condition. Withdrawal of the objection is respectfully requested.

As to the prior art rejections noted in the outstanding Office Action, Applicant has canceled Claims 1-3, 11-14, 21-30 and 60. Therefore, it is believed each of these rejections are now considered moot.

Finally and regarding the remainder of the claim amendments made by Applicant, Claim 17 has been amended to correct an obvious typographical error, Claims 32, 34 and 35 have been amended to delete the term "ring" in favor of the correct term "electrode". Applicant has only recently discovered this latter error, but believes that this inclusion by amendment does not add any new issues for search to the Examiner nor does this change add new matter to the present application. Support is found, for example, on page 11 of the present specification, lines 10-13. Lastly, Applicant has also corrected Claim 38 to indicate that the values of frequency are based on a stimulus parameter, in order to more fully comport with the terminology of independent Claim 31. To that end, it is believed no new matter has been added. Entry of this Amendment is respectfully requested.

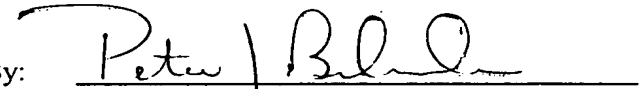
In summary, it is believed the above-captioned patent application is now in an allowable condition and such allowance is earnestly solicited.

If the Examiner wishes to expedite disposition of the above-captioned patent application, he is invited to contact Applicant's representative at the telephone number below.

The Director is hereby authorized to charge any additional fees associated with this communication or credit any overpayment to Deposit Account No. 50-0289.

Respectfully submitted,

WALL MARJAMA & BILINSKI LLP

By: 

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